Appendix 8: Matrix of Pathways and Indicators

Table 1: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 1: No Action) **6th Field watershed**: East Fork Dairy Creek*

FACTORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
INDICATORS	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature			X		T, O	
Turbidity		X			T, O[1]	O[1]
Chem. Contam./Nut.			X		T, O	
Overall (303 (d) reaches)			X		T, O	
Habitat Access: Physical Barriers			X		T, O	
Habitat Elements: Substrate/Sediment	X				T, O[1]	O[1]
Large Woody Debris (LWD)			X		T, O[1]	O[1]
Pool Area %			X		T, O[1]	O[1]
Pool Quality		X			T, O[1]	O[1]
Pool Frequency			X		T, O[1]	O[1]
Off-Channel Habitat			X		T, O[1]	O[1]
Channel Cond. & Dyn.: Streambank Condition		X			T, O	
Floodplain Connectivity			X		T,O[1]	O[1]
Watershed Condition: Road Des. & Loc.			X		T, O	
Disturbance History			X		T, O	
Stream Influence Zone			X		T, O	
Refugia			X		T, O[1]	O[1]

*The projects and analysis occur within two 6th field watersheds, Upper East Fork of Dairy Creek and Lower East Fork of Dairy Creek.

T = timber sale; O = watershed restoration projects.
[1] Maintain in the short term, possible degrade in the long term

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

Table 2: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 2: Proposed Action) **6th Field watershed**: East Fork Dairy Creek*

FACTORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
INDICATORS	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature			X		T, O	
Turbidity		X		T[2]		T[2]
Chem. Contam./Nut.			X		T, O	
Overall (303 (d) reaches)			X		T, O	
Habitat Access: Physical Barriers			X		T, O	
Habitat Elements: Substrate/Sediment	X			T[2], O		T[2]
Large Woody Debris (LWD)			X	O	T	
Pool Area %			X	O	T	
Pool Quality		X		O	T	
Pool Frequency			X	O	T	
Off-Channel Habitat			X	O	T	
Channel Cond. & Dyn.: Streambank Condition		X			T, O	
Floodplain Connectivity			X	O	T	
Watershed Condition: Road Des. & Loc.			X	T[2]	O	T[2]
Disturbance History			X	O	T[3]	T[3]
Stream Influence Zone			X	O	T	
Refugia			X	O	T	

*The projects and analysis occur within two 6th field watersheds, Upper East Fork of Dairy Creek and Lower East Fork of Dairy Creek.

T = timber sale; O = watershed restoration projects
[2] Short term degrade, long term restore
[3] Short term degrade, long term maintain

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

Table 3: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project) **6th Field watershed**: East Fork Dairy Creek*
(Alternative 3: Soil/Water Alternative)

FACTORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
INDICATORS	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature			X		T	
Turbidity		X		T[2]		T[2]
Chem. Contam./Nut.			X		T	
Overall (303 (d) reaches)			X		T	
Habitat Access: Physical Barriers			X		T	
Habitat Elements: Substrate/Sediment	X			T[2]		T[2]
Large Woody Debris (LWD)			X		T	
Pool Area %			X		T	
Pool Quality		X			T	
Pool Frequency			X		T	
Off-Channel Habitat			X		T	
Channel Cond. & Dyn.: Streambank Condition		X			T	
Floodplain Connectivity			X		T	
Watershed Condition: Road Des. & Loc.			X	T[2]		T[2]
Disturbance History			X		T[3]	T[3]
Stream Influence Zone			X		T	
Refugia			X		T	

*The projects and analysis occur within two 6th field watersheds, Upper East Fork of Dairy Creek and Lower East Fork of Dairy Creek.

T = timber sale; O = watershed restoration projects
[2] Short term degrade, long term restore
[3] Short term degrade, long term maintain

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

The baseline condition of the habitat elements is based on a 1994 BLM habitat survey on 13.4 miles of East Fork of Dairy Creek and several tributaries including Denny Creek and Panther Creek. In 1996, county flood control efforts resulted in the channelization and wood removal of approximately 2.5 miles of East Fork of Dairy Creek that was part of the 1994 survey, therefore survey data does not accurately depict the current conditions. The discussion below provides the rationale for the baseline condition and the effect of the action alternatives on baseline for each matrix indicator.

Water Quality

Temperature: The East Fork of Dairy Creek (mouth to Whiskey Creek reach, which is within the analysis area) is on the 303 (d) list for temperature. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The timber harvest and associated activities in Alternative 2 would have little impact on canopy cover over the stream channels due to little harvest in RR (approximately 20 acres) and no-cut buffers on all streams, and therefore would not impact water temperature. In unit 27-1 there will be approximately 14 skyline corridors, each 10-12 feet wide and spaced about 150 feet apart, that cross two small, non-fish bearing streams. These corridors would requiring felling of several trees within the no-cut buffer for each corridor. These openings would be small and are not expected to impact water temperature. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. There would be approximately 35 acres less harvested, and there would be no ground-based yarding in commercial thinning units. Unit 27-1 would still require skyline corridors over the stream as described above. Impacts to water temperature would be negligible. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): The watershed restoration projects under Alternatives 2 - 4 would not adversely impact water temperature. The instream placement of large wood would not use trees from the riparian area and removal/disturbance of other vegetation in the riparian area would be limited by minimizing the number of access points through the riparian area, therefore reduction in canopy cover over the stream would be negligible. Disturbed areas resulting from the fish project and the campground rehabilitation would be planted or seeded with native vegetation (trees, shrubs, grasses, and/or forbs). The road rehabilitation project would also involve planting a disturbed area. The wildlife habitat creation project involves felling of trees, some in RR, however no trees would be felled that

would appreciably reduce stream shading. **Maintain**.

Turbidity: The Dairy-McKay Watershed Analysis (BLM 1999) suggests that turbidity within the watershed may currently be higher than reference conditions. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): Log yarding and hauling, and road building/decommissioning activities may result in short-term sediment input leading to increased turbidity. Road decommissioning following timber harvest would result in over a mile net reduction of road mileage (approximately 6,000 feet) within the watershed, which would reduce long-term potential for sedimentation by increasing infiltration. The following actions would minimize or eliminate sediment movement into streams: limited thinning within RR (approximately 20 acres), no-cut buffers on streams, no ground-based yarding within RR except where logging equipment is able to operate from an existing road or from outside the RR, and roads generally located on benches and ridgetops. Though there is a potential for short-term increases in sediment input to streams, increasing turbidity, the long-term effect would be a decrease in sedimentation due to subsoiling of roads. Short-term **Degrade**, Long-term **Restore**.

Timber Harvest (Alternative 3): The impacts of Alternative 3 would be similar to those of Alternative 2 with the following exceptions: approximately 35 acres less would be harvested, more of the road and timber harvest activities would be limited to the dry season, all commercial thinning areas which would be ground-based harvested under Alternative 2 would be cable yarded or dropped under Alternative 3, and the net decrease in road mileage within the watershed would be approximately 8,000 feet (2,000 feet more than in Alternative 2). The potential for increased turbidity is less than in Alternative 2, however there still would be a short-term **Degrade** with a long-term **Restore** of this indicator.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no direct impact on this indicator. There is a possibility that not implementing the campground rehabilitation portion of the project may result in an increase in turbidity due to runoff from the compacted surfaces. Generally the runoff would maintain at its current level. However, potential for increased unauthorized use may increase sedimentation from this area. **Maintain, with a possible Degrade.**

Watershed restoration projects (Alternatives 2 - 4): There would be some turbidity created through the placement of logs in the stream channel and equipment operating within and adjacent to the stream channel. This turbidity would be short-term, and almost exclusively during the actual instream work. Turbidity and impacts on listed fish would be minimized by following ODFW guidelines for timing of in-water work, minimizing the time that heavy equipment is in the stream channel, minimizing the number of equipment access points

through riparian areas, and planting or seeding disturbed sites prior to winter rains. The campground rehabilitation project has the potential for short-term increase in turbidity due to subsoiling compacted ground near the stream, however in the long-term the potential for increase in turbidity would be maintained or possibly restored due to the decompaction and planting of the campground. The road stabilization may also decrease the potential for sediment runoff leading to turbidity. The wildlife habitat enhancement project has negligible potential to cause an increase in turbidity. Short term **Degrade**, long term **Maintain,** with a possible **Restore.**

Chemical Contamination/Nutrient Input: The East Fork of Dairy Creek (mouth to Whiskey Creek reach, which is within the analysis area) is on the 303 (d) list for pH and temperature. Other reaches within the Dairy Creek 5th field watershed are on the 303 (d) list for bacteria, DO (Dissolved Oxygen) and temperature. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The Proposed Action would not have any effect on chemical or nutrient contamination, this indicator will be **Maintained**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain.**

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain.**

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): There is a possibility of chemical contamination (fuel/oil/hydraulic fluid spills) due to heavy equipment working in and adjacent to streams during both the fish project and the campground rehabilitation project. To minimize the chance of spills equipment would be regularly checked for problems, such as leaks and broken hoses. To minimize impacts should a spill occur instream, containment booms would be placed downstream of equipment working in the stream channel. Any spill would be quickly contained and cleaned up, and would only impact a very small portion of the stream. There would be no *chronic* chemical contamination or nutrient input. The wildlife habitat enhancement and road stabilization projects would not cause or reduce chemical contamination or nutrient input. **Maintain.**

Overall (303 (d) reaches): The East Fork of Dairy Creek (mouth to Whiskey Creek reach, which is within the analysis area) is on the 303 (d) list for pH and temperature. Other reaches within the Dairy Creek 5th field watershed are on the 303 (d) list for bacteria, DO and temperature. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact

on this indicator. Not implementing this action would neither contribute to more 303 (d) listing of stream reaches, nor help in removing any currently listed reaches from the 303 (d) list. **Maintain.**

Timber Harvest (Alternative 2): The Proposed Action would not have any effect on chemical or nutrient contamination, nor would it add or remove any 303 (d) listed reaches, therefore this indicator will be **Maintained**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. Not implementing these actions would neither contribute to more 303 (d) listing of stream reaches, nor help in removing any currently listed reaches from the 303 (d) list. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): There is a possibility of short term turbidity and sediment input into the stream through the placement of logs in the stream channel and equipment operating within and adjacent to the stream channel. Turbidity and sediment input would be short-term, and almost exclusively during the actual instream work. Impacts to listed fish would be minimized by following ODFW guidelines for timing of in-water work, minimize time that heavy equipment is in the stream channel, minimizing the number of equipment access points through riparian areas, and planting or seeding any disturbed sites prior to winter rains. The watershed restoration projects would have no impact on this indicator. These projects would not contribute to any additional 303 (d) listings, or help remove this reach from the 303 (d) list for sedimentation. **Maintain.**

Habitat Access

Physical Barriers: There are known fish passage barriers throughout the Dairy Creek watershed identified in the Dairy-McKay Watershed Analysis (BLM 1999). **Not Properly Functioning**.

Timber Harvest (Alternative 1): Implementing this action would not remove any barriers to fish passage, therefore not implementing this action would have no impact on fish passage barriers. **Maintain**.

Timber Harvest (Alternative 2): Implementing this action would not create or remove any barriers to fish passage. **Maintain**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): Implementing these actions would not remove any barriers to fish passage, therefore not implementing this action would have no impact on fish passage barriers. **Maintain**.

Watershed restoration projects (Alternatives 2 - 4): None of the projects proposed would create or remove barriers to fish passage. **Maintain**.

Habitat Elements

Substrate/Sediment: Approximately 8 % of low gradient riffle habitat units had sand or silt as primary or secondary substrate. **Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): Log yarding and hauling, and road building/decommissioning activities may result in short-term sediment input to streams. Road decommissioning following timber harvest would result in over a mile net reduction of road mileage (approximately 6,000 feet) within the watershed, which would reduce long-term potential for sedimentation by increasing infiltration. The following actions would minimize or eliminate sediment movement into streams: limited thinning within RR (approximately 20 acres), no-cut buffers on streams, no ground-based yarding within RR except where logging equipment is able to operate from an existing road or from outside the RR, subsoiling of skid trails within regeneration harvest areas, and roads generally located on benches and ridgetops. Though there is a potential for short-term increases in sediment input to streams, increasing turbidity, the long-term effect would be a decrease in sedimentation due to subsoiling of roads. Short-term **Degrade**, Long-term **Restore**.

Timber Harvest (Alternative 3): The impacts of Alternative 3 would be similar to those of Alternative 2 with the following exceptions: more of the road and timber harvest activities would be limited to the dry season, all commercial thinning areas which would be ground-based harvested under Alternative 2 would be cable yarded or dropped under Alternative 3, and the net decrease in road mileage within the watershed would be approximately 8,000 feet (2,000 feet more than in Alternative 2). The potential for increased sedimentation is less than in Alternative 2, however there still would be a short-term **Degrade** with a long-term **Restore** of this indicator.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no direct impact on this indicator. There is a possibility that not implementing the campground rehabilitation portion of the project may result in an increase in sediment reaching the East Fork of Dairy Creek due to runoff from the compacted surfaces. Generally the runoff would maintain at its current level. However, potential for increased unauthorized

use may increase sedimentation from this area. **Maintain, with a possible Degrade.**

Watershed restoration projects (Alternatives 2 - 4): Addition of large wood to the stream channel would help sort substrate by creating slow water areas (pools and backwater) where fine particle naturally are deposited, and by trapping gravels in riffle areas. This would help prevent fine particles from depositing in riffles and increase amount of gravels in riffles. The campground rehabilitation and road stabilization projects would decrease the potential of sediment entering the stream channel in the long-term. The wildlife habitat enhancement project would have no impact on sediment movement or stream substrate. **Restore.**

Large Woody Debris: The surveyed reaches contained 3.1 pieces of large wood per mile. Large wood in this survey was defined as at least 10 feet in length and at least 20 inches in diameter. The current amount of large wood is probably less due to the 1996 flood control efforts. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore the current and future sources of large wood to the stream would be maintained. **Maintain**.

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): No action would occur, therefore the current and future sources of large wood to the stream would be **Maintained**, at least in the short-term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. This indicator may **Degrade**, unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): These projects include a fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel. **Restore.**

Pool Area %: Surveyed reaches had 24% of total area in pools. This percentage may currently be lower due to channelization and wood removal during 1996 flood control efforts. **Not Properly**

Functioning.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the amount of pools within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. Since pools are often formed by large wood, this indicator may **Degrade** in the long term unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood..

Watershed restoration projects (Alternatives 2 - 4): These projects includes an fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. Large wood facilitates the formation of pools, which would increase the amount of area in pools. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel or pool area. **Restore.**

Pool Quality: 15% of pools were greater than 1 meter deep. This percentage may currently be lower due to channelization and wood removal during 1996 flood control efforts. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the amount of quality pools within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but

the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. Since pools are often formed by large wood, this indicator may **Degrade** in the long term, unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): These projects includes an fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. Large wood facilitates the formation of deep pools, thus there should be an increase in the number of quality pools, and added complexity supplied by large wood will further improve habitat. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel or pool quality. **Restore.**

Pool Frequency: This indicator could not be determined because channel width data was not available. However, due to the low percent of area in pools, the indicator is also expected to be **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the pool frequency within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as

current large wood decomposes there will be little replacement. Since pools are often formed by large wood, this indicator may **Degrade** in the long term unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): These projects includes an fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. Large wood facilitates the formation of pools, thus there should be an increase in the pool frequency, and added complexity supplied by large wood will further improve habitat. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel or pool frequency. **Restore.**

Off-Channel Habitat: Off-channel habitat makes up 3% of the area surveyed. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream, which may help provide off-channel habitat. No portion of the action would result in a reduction of off-channel habitat. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Maintain**.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. Since off-channel habitat is often formed by large wood, this indicator may **Degrade** in the long term unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): These projects includes an fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. Large wood improves connections between the stream channel and the floodplain, and creates off-channel habitat. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within

RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel or off-channel habitat. **Restore.**

Channel Conditions

Streambank Condition: Eroding streambanks are common in the lower portion of the Dairy Creek 5th field watershed (BLM 1999). No data is available for the upper watershed within the analysis area. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would eliminate any impacts to streambanks from logging activities. Where logs will be yarded across a steam in unit 27-1, full suspension would be required, therefore no streambank impacts would occur. **Maintain**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): Heavy equipment adjacent to and entering the stream channel may disturb streambanks while implementing the fish habitat enhancement project. However, impacts would be minimized by following ODFW guidelines for timing of in-water work when flows are low and potential for erosion is negligible, minimizing the number of equipment access points through riparian areas and along streambanks, and planting or seeding any disturbed sites prior to winter rains. The amount of actively eroding streambank is not expected to increase. The watershed restoration projects would not have an impact on streambanks. **Maintain**.

Floodplain Connectivity: Lack of wood in the channel and almost no off-channel habitat indicates substantial loss of floodplain connectivity. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would maintain the current and future sources of large wood to the stream and floodplain, which improves floodplain connectivity. **Maintain**.

Timber Harvest (Alternative 3): Same as alternative 2. There is a little less RR harvest, but

the effect would be the same. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. Since floodplain connections usually are formed by large wood, this indicator may **Degrade** in the long term unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): These projects includes an fish habitat enhancement project that would result in addition of large wood to the stream channel and floodplain. Large wood improves connections between the stream channel and the floodplain. The wildlife habitat enhancement project would result in girdling (to create snags) and felling (to release neighboring trees) some trees within RR; impacts are expected to be either beneficial or benign. The watershed restoration projects would have no effect on amount of LWD in the stream channel or floodplain connectivity. **Restore.**

Watershed Conditions

Road Density and Location: Data collected by BLM show a road density of 4.27 miles/mile^2 within the Dairy Creek 5th field watershed. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The would be 2,000 feet of new permanent road construction, 3,000 feet of semi-permanent road construction. A small amount of new road may be constructed within the outer edge of RR in unit 21-1, and would be decommissioned at the end of the project (at this point the RR boundaries and the location of the road are not marked exactly; the road may not be in RR). In unit 3-1, a road that crosses a stream would be reconstructed for use. Road density will be slightly increased for the duration of the project due to new road construction, however decommissioning at the end of the action would result in a net decrease in road mileage of 6,000 feet within the East Fork of Dairy Creek analysis area. New roads are generally located on benches and ridgetops. This indicator will be **Degraded** in the short-term but **Restored** in the long-term.

Timber Harvest (Alternative 3): The would be 5,000 feet of semi-permanent road construction, and no new permanent road construction under this alternative. A small amount of new road may be constructed within the outer edge of RR in unit 21-1, and would be decommissioned at the end of the project (at this point the RR boundaries and the

location of the road are not marked exactly; the road may not be in RR). In unit 3-1, a road that crosses a stream would be reconstructed for use. The road decommissioning included as part of this project would result a net decrease of 8,000 feet of road within the watershed. Short-term **Degrade**, long-term **Restore**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. Short-term **Degrade**, long-term **Restore**.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**
Watershed restoration projects (Alternatives 2 - 4): Since no roads would be built or decommissioned, this indicator would be **Maintained.**

Disturbance History: Terrestrial vegetation has been extensively altered from reference conditions throughout the watershed. Agriculture, timber harvest and urbanization has fragmented the watershed (BLM 1999). **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The timber harvest activities within this portion of the watershed include approximately 165 acres of regeneration harvest, and approximately 200 acres of commercial thinning. The timber harvest, particularly the regeneration, would create some additional disturbance within the watershed. In the long term, the areas that are proposed for regeneration harvest would be replanted with trees, and are expected to be healthier and more diverse than if left alone. The commercial thinning units would be expected to develop better understory vegetation and become more diverse through time. There would be a temporary increase in road mileage within the watershed, however there would be a net decrease of 6,000 feet of road after completion of timber harvest activities. **Degrade** in the short-term, **Maintain** in the long-term.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. There would be the same amount of regeneration harvest and approximately 35 acres less of commercial thinning. There would still be a temporary increase in road mileage, with a net decrease of 8,000 feet of road after completion of timber harvest activities. **Degrade** in the short-term, **Maintain** in the long-term.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area. **Degrade** in the short-term, **Maintain** in the long-term.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): Addition of large wood to the streams

and the floodplains will help supply some of the large wood that the riparian areas currently cannot. Planting native vegetation in the riparian area as part of the campground rehabilitation project will help maintain and restore shading and future input of large wood to the stream channel. The road stabilization project will be planted with native vegetation, reducing the current disturbance. The wildlife habitat project won=t change the disturbance within the watershed, though it would create more habitat complexity. **Restore**.

Stream Influence Zone: Riparian zones have been impacted in the past due to agriculture, timber harvest and urbanization. The upper watershed does contain some areas that are intact or have recovered to some extent, but probably less than 60% of the analysis area. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within the outer portion of RR (approximately 20 acres) would result in negligible disturbance to stream influence zones. In unit 27-1 there will be approximately 14 skyline corridors, each 10-12 feet wide and spaced about 150 feet apart, that cross two small, non-fish bearing streams. These corridors would requiring felling of a several trees within the no-cut buffer for each corridor. These openings would be small and are expected to have little impact on the stream influence zone. Trees felled within the no-cut buffer for the corridors would be left on site in the stream or in the riparian, which may benefit this indicator. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. Differences in amount of acres harvested would result in negligible differences in impacts. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Watershed restoration projects (Alternatives 2 - 4): Addition of large wood to the streams and the floodplains will help supply some of the large wood that the riparian areas currently cannot. Planting native vegetation in the riparian area as part of the campground rehabilitation project will help maintain and restore shading and future input of large wood to the stream channel. The road stabilization and wildlife habitat enhancement will have no impact on the stream influence zone. **Restore**.

Refugia: Survey data and professional judgement rate most of the habitat indicators within the analysis area as Not Properly Functioning. The Dairy-McKay Watershed Analysis (BLM 1999) describes current aquatic habitat quality as substantially reduced from reference conditions. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 20 acres) would buffer aquatic and riparian habitat and maintain the current and future sources of large wood to the stream and floodplain, which help **Maintain** refugia.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.
Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Units dropped are not within this portion of the analysis area.

Watershed restoration projects (Alternative 1): Since Alternative 1 is the "No Action" alternative, this matrix indicator would be **Maintained,** at least in the short term. However, since many riparian areas within the East Fork of Dairy Creek watershed either lack conifers or the trees will not be large enough for many decades to provide input of large wood, as current large wood decomposes there will be little replacement. Since refugia is usually are formed by large wood, this indicator may **Degrade** in the long term unless some large wood is added to sustain current levels until riparian conifers are abundant enough and old enough to provide natural input of large wood.

Watershed restoration projects (Alternatives 2 - 4): Addition of large wood to the stream channel and floodplain and planting native vegetation in the riparian area (both the campground rehabilitation and fish habitat enhancement projects) will help maintain and restore refugia within the watershed. The wildlife habitat enhancement and the road stabilization will have little impact on refugia. **Restore.**

Table 4: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 1: No Action) **6th Field watershed**: Upper McKay Creek

FACTORS / INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature		X			X	
Turbidity		X			X	
Chem. Contam./Nut.	X				X	
Overall (303 (d) reaches)	X				X	
Habitat Access: Physical Barriers			X		X	
Habitat Elements: Substrate/Sediment	X				X	
Large Woody Debris (LWD)			X		X	
Pool Area %			X		X	
Pool Quality			X		X	
Pool Frequency			X		X	
Off-Channel Habitat			X		X	
Channel Cond. & Dyn.: Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Watershed Condition: Road Des. & Loc.			X		X	
Disturbance History			X		X	
Stream Influence Zone			X		X	
Refugia			X		X	

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

Table 5: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 2: Proposed Action) **6th Field watershed**: Upper McKay Creek

FACTORS / INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature		X			X	
Turbidity		X			X[1]	X[1]
Chem. Contam./Nut.	X				X	
Overall (303 (d) reaches)	X				X	
Habitat Access: Physical Barriers			X		X	
Habitat Elements: Substrate/Sediment	X				X[1]	X[1]
Large Woody Debris (LWD)			X		X	
Pool Area %			X		X	
Pool Quality			X		X	
Pool Frequency			X		X	
Off-Channel Habitat			X		X	
Channel Cond. & Dyn.: Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Watershed Condition: Road Des. & Loc.			X			X
Disturbance History			X		X[1]	X[1]
Stream Influence Zone			X		X	
Refugia			X		X	

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

X[1] = short term degrade, long term maintain

Table 6: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 3: Soil/Water Alternative) **6th Field watershed**: Upper McKay Creek

FACTORS / INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature		X			X	
Turbidity		X			X[1]	X[1]
Chem. Contam./Nut.	X				X	
Overall (303 (d) reaches)	X				X	
Habitat Access: Physical Barriers			X		X	
Habitat Elements: Substrate/Sediment	X				X[1]	X[1]
Large Woody Debris (LWD)			X		X	
Pool Area %			X		X	
Pool Quality			X		X	
Pool Frequency			X		X	
Off-Channel Habitat			X		X	
Channel Cond. & Dyn.: Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Watershed Condition: Road Des. & Loc.			X	X[2]		X[2]
Disturbance History			X		X[1]	X[1]
Stream Influence Zone			X		X	
Refugia			X		X	

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

X[1] = short term degrade, long term maintain
X[2] = short term degrade, long term restore

Table 7: CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS AT THE PROJECT LEVEL

Administrative Unit: Salem District BLM **5th field watershed**: Dairy Creek
Project: Plentywater Project (Alternative 4: Urban Interface Alternative) **6th Field watershed**: Upper McKay Creek

FACTORS / INDICATORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature		X			X	
Turbidity		X			X[3]	X[3]
Chem. Contam./Nut.	X				X	
Overall (303 (d) reaches)	X				X	
Habitat Access: Physical Barriers			X		X	
Habitat Elements: Substrate/Sediment	X				X[3]	X[3]
Large Woody Debris (LWD)			X		X	
Pool Area %			X		X	
Pool Quality			X		X	
Pool Frequency			X		X	
Off-Channel Habitat			X		X	
Channel Cond. & Dyn.: Streambank Condition		X			X	
Floodplain Connectivity			X		X	
Watershed Condition: Road Des. & Loc.			X		X[3]	X[3]
Disturbance History			X		X[1]	X[1]
Stream Influence Zone			X		X	
Refugia			X		X	

Note: effects are based on which way this project is likely to move the relevant indicator, but no change in baseline condition is expected.

X[1] = short term degrade, long term maintain
X[2] = short term degrade, long term restore
X[3] = short term degrade, long term could be either degrade or maintain

The baseline condition of the habitat elements is based on a 1993 BLM habitat survey on 5.3 miles of McKay and East Fork McKay Creeks. The discussion below provides the rationale for the baseline condition and the effect of the action on baseline for each matrix indicator. Only timber harvest an associated activities are proposed for this 6th field watershed, therefore there is no

"watershed restoration projects" category discussed.

Water Quality

Temperature: There are no reaches within this analysis area on McKay Creek on the 303 (d) list for temperature. However, two reaches of Dairy Creek (mouth to East/West Forks, and East Fork Dairy from mouth to Whiskey Creek) are on the 303 (d) list for temperature, indicating McKay Creek may also have some temperature problems as well. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The timber harvest and associated activities in Alternative 2 would have no impact on canopy cover over the stream channels due to little harvest in RR (approximately 15 acres) and no-cut buffers on all streams, and therefore would not impact water temperature. **Maintain**.

Timber Harvest (Alternative 3):. Generally the same as Alternative 2. There will be approximately 9 acres harvested in RR. There would still be no impact on canopy cover over the stream channels due to little harvest in RR and no-cut buffers on all streams, therefore no impacts to water temperature anticipated. **Maintain**.

Timber Harvest (Alternative 4): Only unit 7-1 would be harvested, resulting in about 100 less acres harvested than in Alternative 3 and 120 acres less than in Alternative 2. There would be no regeneration harvest and little to no harvest using ground-based equipment There would still be no impact on canopy cover over the stream channels due to little harvest in RR (only about 5 acres) and no-cut buffers on all streams, therefore no impacts to water temperature are anticipated. **Maintain**.

Turbidity: The Dairy-McKay Watershed Analysis (BLM 1999) suggests that turbidity within the watershed may currently be higher that reference conditions. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): Log yarding and hauling, and road building/decommissioning activities may result in short-term sediment input leading to increased turbidity. Road density will be slightly increased in the Upper McKay Creek 6th field watershed due to new road construction (a net increase of 1,100 feet), though decommissioning within the Dairy Creek 5th field watershed at the end of the action(s) would result in a net decrease in road mileage of 5,700 feet (1.07 miles). Addition of new road could increase the long-term potential for sedimentation leading to increased turbidity by reducing the water infiltration capacity and increasing surface runoff, though new roads are generally located on benches and ridgetops, which would reduce the potential for sediment reaching streams. The following actions would minimize sediment movement into streams:

limited thinning within RR (approximately 15 acres), no-cut buffers on streams, no ground-based yarding within RR except where logging equipment is able to operate from an existing road or from outside the RR, and roads generally located on benches and ridgetops. There is a potential for short-term increases in sediment input to streams, increasing turbidity. Over the long-term, turbidity is expected to be maintained at the current level, even with the small net increase in road mileage. Short-term **Degrade**, Long-term **Maintain.**

Timber Harvest (Alternative 3): The impacts of Alternative 3 would be similar to those of Alternative 2. The following differences would help further to reduce the potential for increasing turbidity: more of the timber harvest activities would be limited to the dry season, most of the commercial thinning areas which would be ground-based harvested under Alternative 2 would be cable yarded or dropped under Alternative 3, there would be 4,700 feet of semi-permanent road construction, no new permanent road construction, and there would be net decrease of 1,400 feet of road within the watershed. The potential for increased turbidity is less than in Alternative 2, however there still would be a short-term **Degrade** with a long-term **Maintain** of this indicator.

Timber Harvest (Alternative 4): Under this alternative only unit 7-1 would be harvested, either as described under Alternative 2 or Alternative 3. This would reduce the acreage being harvested by up to 120 acres, which would reduce the potential for increased turbidity. As described in Alternative 2, there would be 3,000 feet of new permanent road construction and no road decommissioning, resulting in a net increase of 3,000 feet of road within the watershed, which would have the potential for increased turbidity both in the short term and the long term. As described in Alternative 3 there would be 3,000 feet of new semi-permanent road construction, and no additional decommissioning, resulting in no net increase or decrease in road mileage, resulting in a potential short term increase in turbidity, but probably maintaining in the long term. The indicator would be **Degraded** in the short term in either case. Depending on whether Alternative 2 or 3, or a combination, was selected, this indicator could either be **Maintained** or **Degraded** (due to the potential of 3,000 feet of new road within the watershed) in the long term.

Chemical Contamination/Nutrient Input: McKay Creek (mouth to East Fork McKay Creek reach) is on the 303 (d) list for bacteria. This listed reach is downstream of the analysis area. There are no 303 (d) listed streams within the analysis area. **Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The Proposed Action would not have any effect on chemical or nutrient contamination, this indicator will be **Maintained**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain.**

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Several units are dropped under this alternative, however there still would be no effect on this indicator. **Maintain.**

Overall (303 (d) reaches): McKay Creek (mouth to East Fork McKay Creek reach) is on the 303 (d) list for bacteria. This listed reach is downstream of the analysis area. There are no 303 (d) listed streams within the analysis area. **Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The Proposed Action would not have any effect on chemical or nutrient contamination, nor would it add or remove any 303 (d) listed reaches, therefore this indicator will be **Maintained**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. Several units are dropped under this alternative, however there still would be no effect on this indicator. **Maintain.**

Habitat Access

Physical Barriers: There are known fish passage barriers throughout the Dairy Creek watershed identified in the Dairy-McKay Watershed Analysis (BLM 1999). **Not Properly Functioning**.

Timber Harvest (Alternative 1): Implementing this action would not remove any barriers to fish passage, therefore not implementing this action would have no impact on fish passage barriers. **Maintain**.

Timber Harvest (Alternative 2): Implementing this action would not create or remove any barriers to fish passage. **Maintain**.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2 and/or 3. **Maintain**.

Habitat Elements

Substrate/Sediment: Approximately 6% of low gradient riffle habitat units had sand or silt as primary or secondary substrate. **Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): Log yarding and hauling, and road building/decommissioning activities may result in short-term sediment input to streams. Road density will be slightly increased in the Upper McKay Creek 6th field watershed due to new road construction (a net increase of 1,100 feet), though decommissioning within the Dairy Creek 5th field watershed at the end of the action would result in a net decrease in road

mileage of 5,700 feet (1.07 miles) feet (0.9 miles). Addition of new road could increase the long-term potential for sedimentation by reducing the water infiltration capacity and increasing surface runoff, though new roads are generally located on benches and ridgetops, which would reduce the potential for sediment reaching streams. The following actions would minimize sediment movement into streams: limited thinning within RR (approximately 15 acres), no-cut buffers on streams, no ground-based yarding within RR except where logging equipment is able to operate from an existing road or from outside the RR, and roads generally located on benches and ridgetops. There is a potential for short-term increases in sediment input to streams. Over the long-term, substrate composition is expected to be maintained at the current level, even with the small net increase in road mileage. Short-term **Degrade**, Long-term **Maintain.**

Timber Harvest (Alternative 3): The impacts of Alternative 3 would be similar to those of Alternative 2. The following differences would help further to reduce the potential for increasing turbidity: more of the timber harvest activities would be limited to the dry season, most of the commercial thinning areas which would be ground-based harvested under Alternative 2 would be cable yarded or dropped under Alternative 3, there would be 4,700 feet of semi-permanent road construction, no new permanent road construction, and there would be net decrease of 1,400 feet of road within the watershed. The potential for potential for short-term increases in sediment input to streams is less than in Alternative 2, however there still would be a short-term **Degrade** with a long-term **Maintain** of this indicator.

Timber Harvest (Alternative 4): Under this alternative only unit 7-1 would be harvested, either as described under Alternative 2 or Alternative 3. This would reduce the acreage being harvested by up to 120 acres, which would reduce the potential for sediment movement into streams. As described in Alternative 2, there would be 3,000 feet of new permanent road construction and no road decommissioning, resulting in a net increase of 3,000 feet of road within the watershed, which would have the potential for increased sediment movement into streams both in the short term and the long term. As described in Alternative 3 there would be 3,000 feet of new semi-permanent road construction, and no additional decommissioning, resulting in no net increase or decrease in road mileage, resulting in a potential short term increase in sediment movement into streams, but probably maintaining sediment levels and substrate composition in the long term. The indicator would be **Degraded** in the short term in either case. Depending on whether Alternative 2 or 3, or a combination, was selected, this indicator could either be **Maintained** or **Degraded** (due to the potential of 3,000 feet of new road within the watershed) in the long term.

Large Woody Debris: Data on large wood was recorded as sum lengths and average diameters, so number of pieces per mile could not be calculated. However, the amount of large wood was very low. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore the current and future sources of large wood to the stream would be maintained. **Maintain**.

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning

within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.
Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Pool Area %: Surveyed reaches had 29% of total area in pools. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the amount of pools within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Pool Quality: 6.5% of pool habitat units are greater than 1m in depth. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the amount of quality pools within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Pool Frequency: This indicator could not be determined because channel width data was not available. However, due to the low percent of area in pools, the indicator is also expected to be **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream, which is the main pool-forming element. No other portion of this alternative would alter the pool frequency within the watershed. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Off-Channel Habitat: Off-channel habitat makes up 1.8% of the area surveyed. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream, which may help provide off-channel habitat. No portion of the action would result in a reduction of off-channel habitat. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Channel Conditions

Streambank Condition: Eroding streambanks are common in the lower portion of the Dairy Creek 5th field watershed (BLM 1999). No data is available for the upper watershed within the analysis area. **At Risk**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would eliminate any impacts to streambanks from logging activities. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would eliminate any impacts to streambanks from logging activities. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Floodplain Connectivity: Lack of wood in the channel and almost no off-channel habitat indicates substantial loss of floodplain connectivity. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would maintain the current and future sources of large wood to the stream and floodplain, which improves floodplain connectivity. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within RR (10 acres) would maintain the current and future sources of large wood to the stream. **Maintain**.

Timber Harvest (Alternative 4): Several harvest units would be dropped under this alternative, and only about 5 acres of RR would be thinned, however the impact would be the same as described for Alternative 2 and/or 3. **Maintain**.

Watershed Conditions

Road Density and Location: Data collected by BLM show a road density of 4.27 miles/mile^2 within the Dairy Creek 5th field watershed. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): Road density will be slightly increased in the Upper McKay Creek 6th field watershed due to new road construction (a net increase of 1,100 feet). At the 5th field watershed scale decommissioning within the Dairy Creek watershed at the end of the

action would result in a net decrease in road mileage of 5,700 feet (1.07 miles). New roads are generally located on benches and ridgetops, however the increase in mileage within the 6th field watershed would **Degrade** this indicator.

Timber Harvest (Alternative 3): There would be 4,700 feet of semi-permanent road construction, and no new permanent road construction under this alternative. The road decommissioning included as part of this project would result a net decrease of 1,400 feet of road within the watershed. Short-term **Degrade**, long-term **Restore**.

Timber Harvest (Alternative 4): Under this alternative only unit 7-1 would be harvested, either as described under Alternative 2 or Alternative 3. As described in Alternative 2, there would be 3,000 feet of new permanent road construction and no road decommissioning, resulting in a net increase of 3,000 feet of road within the watershed. As described in Alternative 3 there would be 3,000 feet of new semi-permanent road construction, and no additional decommissioning, resulting in no net increase or decrease in road mileage. Depending on whether Alternative 2 or 3, or a combination, was selected, this indicator could either be **Maintained** or **Degraded**.

Disturbance History: Terrestrial vegetation has been extensively altered from reference conditions throughout the watershed. Agriculture, timber harvest and urbanization has fragmented the watershed (BLM 1999). **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): The timber harvest activities within this portion of the watershed include about 80 acres of regeneration harvest, and about 90 acres of commercial thinning. The timber harvest, particularly the regeneration, would create some addition disturbance within the watershed. In the long term, the areas that are proposed for regeneration harvest would be replanted with trees, and are expected to be healthier and more diverse than if left alone. The commercial thinning units would be expected to develop better understory vegetation and become more diverse through time. **Degrade** in the short-term, **Maintain** in the long-term.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. There would be the same amount of regeneration harvest, which would create the most disturbance, and about 30 acres less of commercial thinning. **Degrade** in the short-term, **Maintain** in the long-term.

Timber Harvest (Alternative 4): Under this alternative no regeneration harvest would take places, and only 50 acres of commercial thinning. Though some disturbance is expected to occur when harvesting timber, this amount of thinning is expected to have little impact on disturbance at the 6th field watershed scale. **Maintain**.

Stream Influence Zone: Riparian zones have been impacted in the past due to agriculture, timber harvest and urbanization. The upper watershed does contain some areas that are intact or have

recovered to some extent, but probably less than 60% of the analysis area. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within the outer portion of RR (approximately 15 acres) would result in negligible disturbance to stream influence zones. **Maintain**.

Timber Harvest (Alternative 3): Generally the same as Alternative 2. No-cut buffers on all streams and a very limited thinning within the outer portion of RR (approximately 10 acres) would result in negligible disturbance to stream influence zones. **Maintain**.

Timber Harvest (Alternative 4): All units except 7-1 would be dropped under this alternative. No-cut buffers and very little thinning in RR (approximately 5 acres) would result in negligible disturbance to stream influence zones. **Maintain**.

Refugia: Survey data and professional judgement rate most of the habitat indicators within the analysis area as Not Properly Functioning. The Dairy-McKay Watershed Analysis (BLM 1999) describes current aquatic habitat quality as substantially reduced from reference conditions. **Not Properly Functioning**.

Timber Harvest (Alternative 1): No action would occur, therefore there would be no impact on this indicator. **Maintain.**

Timber Harvest (Alternative 2): No-cut buffers on all streams and a very limited thinning within RR (approximately 15 acres) would buffer aquatic and riparian habitat and maintain the current and future sources of large wood to the stream and floodplain, which help **Maintain** refugia.

Timber Harvest (Alternative 3): Same as Alternative 2. **Maintain**.

Timber Harvest (Alternative 4): Same as Alternative 2, except there would be less harvest (only unit 7-1) and only 5 acres within RR. **Maintain**.